



Untapping Critical Minerals Value from Mine Waste through biotechnology

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Addressing Mine Waste Liabilities

ENVIRONMENTAL IMPACTS

200 ACTIVE MINES¹⁵

and approximately **10,000 abandoned mines**¹⁶ in Canada present the single largest source of waste produced by any natural resources industry

650.0
MILLION TONNES+

of mine waste are deposited by the Canadian mining industry yearly^{17,18}

20.0-200.0
TONNES OF SOLID WASTE GENERATED

per tonne of metal extracted for most base metals¹⁹

FINANCIAL LIABILITIES

\$10.0 BILLION

In liability costs associated with ongoing treatment of mine wastes.

The Opportunity

FINANCIAL OPPORTUNITIES

\$8.0-10.0

BILLION

in nickel contained in mining waste in the Sudbury region²⁴

\$2.0 BILLION+

mineral value in Alberta oil sands tailings²⁷

\$10.0 BILLION

in estimated value stored in Canada's gold mine waste²⁵

\$2.4 TRILLION

in copper contained in mine waste globally²⁶

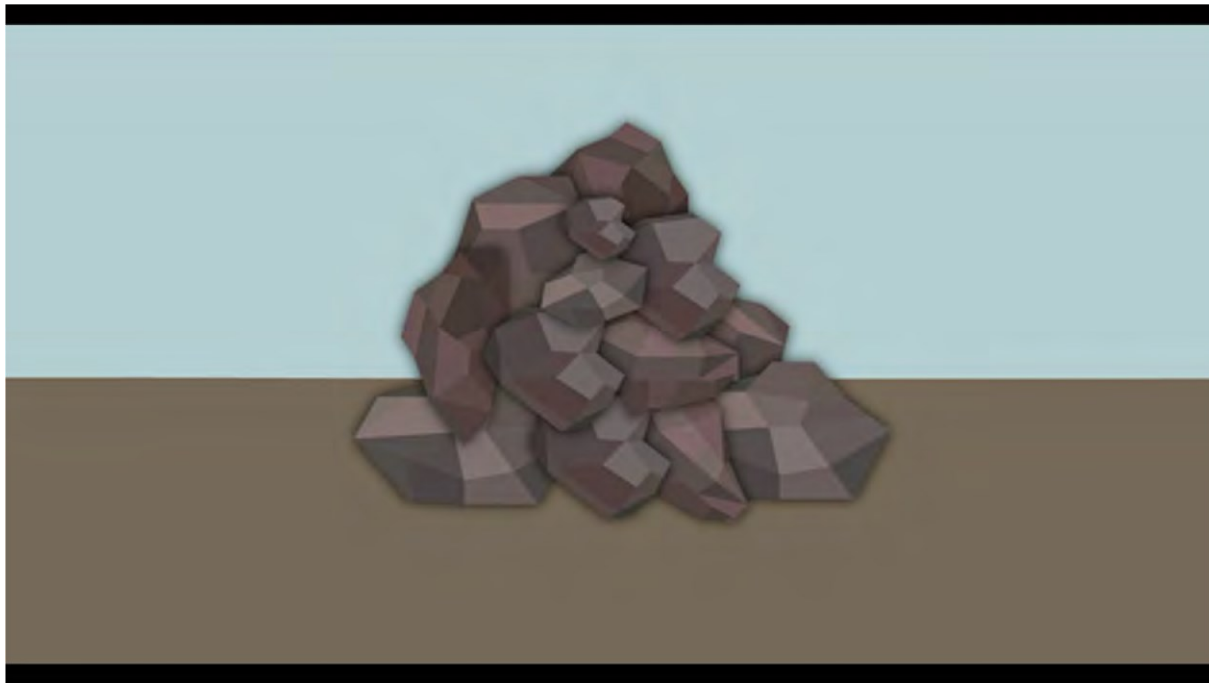
DEMAND FOR

BATTERIES

expected to triple the available supply by 2030²⁸

Harnessing Microbial Abilities to Extract Metals

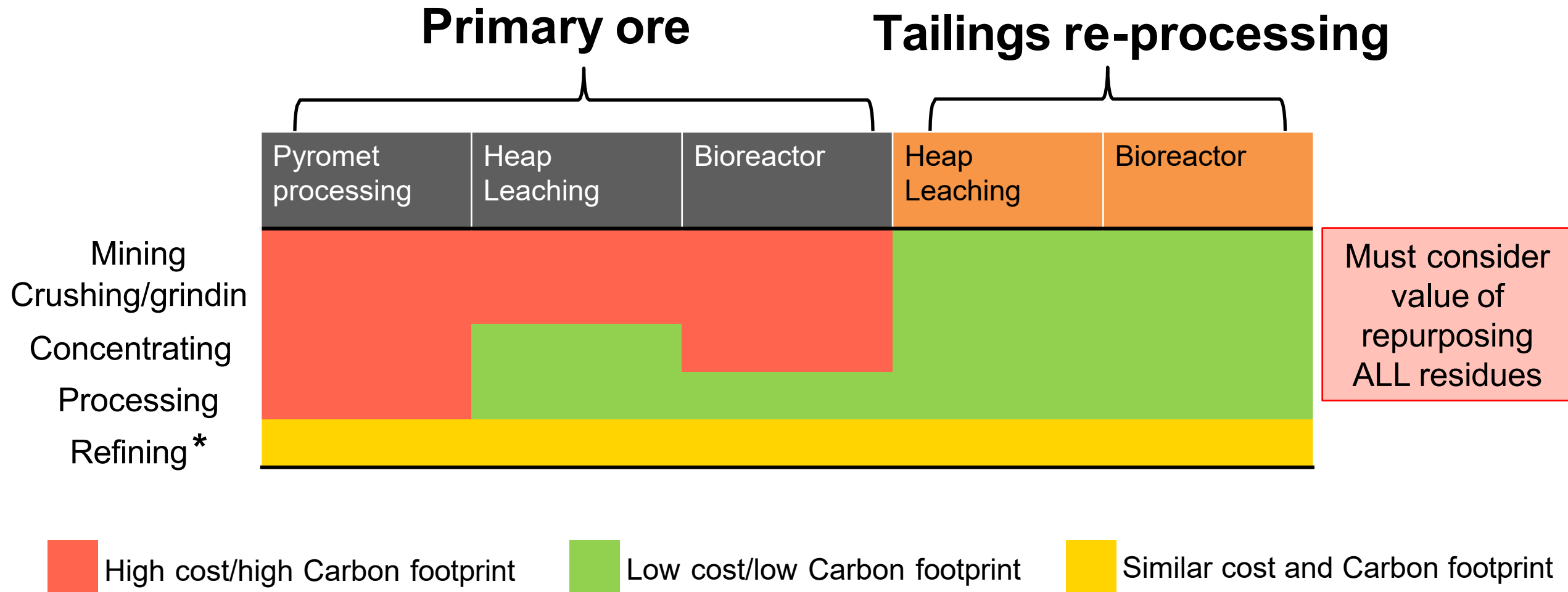
Bioreaching/biomining: the controlled use of bacteria to extract metals from ores, concentrates, or wastes



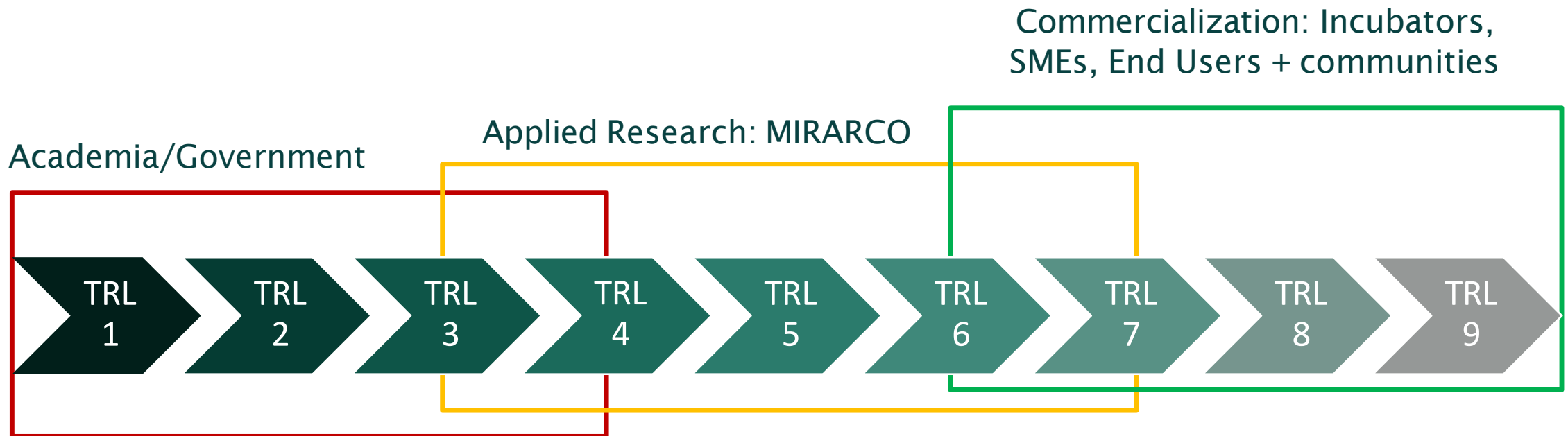
Recover
more
minerals
for sale
\$

Render
wastes
less
reactive,
lower risk

Green advantages of biomining



How do we accelerate (bio)technologies up the chain?



Circularity depends on connecting across innovation nodes AND supply chain

The Centre for Mine Waste Biotechnology



Biomining



Bioreactors



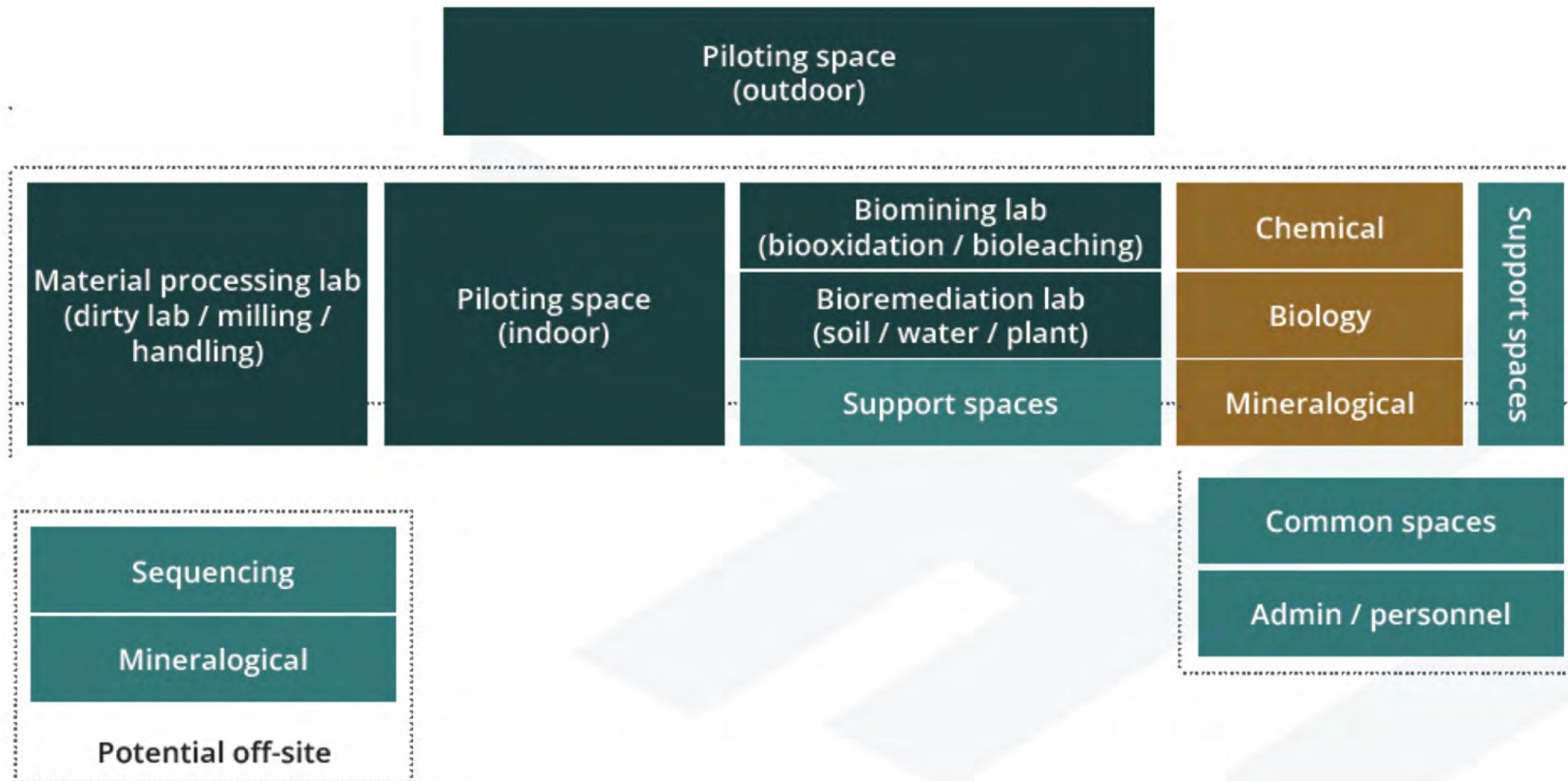
Soil/phyto remediation



Treatment wetlands

A facility to help accelerate the scale up and de-risking of biotechnologies for sustainable mine waste valorization and remediation

Centre Facilities



Feasibility considered for 45,000 sqft facility



Capital Funding Requests: \$40.0M+



Abandoned mines are a key element to supporting Ontario/Canada's Critical Minerals Strategy

The Centre's biotechnologies will support in advancing Ontario and Canada's position as a global leader in critical mineral supply chain through the following:



Supporting Ontario Critical Minerals Strategy



Addressing mining industry challenges



Creating jobs for the province



On-the-job opportunities to address gap in skills



Attracting students, researchers, and additional mining industry



Growth of new companies in the mining supply chain

“ To meet critical metal demands of tomorrow, the Canadian mineral resource sector must look beyond traditional practices, and invest in innovative and sustainable technologies and expertise



Questions?

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